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ABSTRACT

This report examines student performance on a test composed of items developed to be aligned with the Charleston County School District (CCSD) Language Arts Comprehension Curriculum. The report contains a data analysis section that explains the relationship between two basic concepts of the Rasch measurement model, item difficulty and student ability. The report then discusses curriculum charts which have been constructed for grades 1 through 5. Item difficulty, student ability, and item response patterns were used to analyze group performance on the curriculum objectives within each of the 14 domains of the CCSD Language Arts Comprehension Curriculum. The domains were collapsed into five content areas: vocabulary knowledge; main idea; literal comprehension; inferential comprehension; and analysis of literature. The report includes recommendations within each content area. Ten figures are also included. (MS)

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Research Report

Office of Evaluation and Research

Analysis of the Language Arts Comprehension Curriculum:

Grades 1 - 5

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July 13, 1987

CS211559

Report No. 87-19

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Executive Summary

This report examines student performance on a test composed of items developed to be aligned with the CCSD Language Arts Comprehension Curriculum. Test items were pilot tested in May of 1986, and analyzed using the Rasch measurement model. This report is divided into three sections: Data Analysis, Curriculum Charts, and Analysis by Objectives.

The Data Analysis section explains the relationship between two basic concepts of the Rasch measurement model. These concepts are item difficulty and student ability. Item difficulty and student ability are each measured with the same scale and can be plotted along the same continuum. Two caveats are stressed. First, student ability as used in this report should not be confused with notions such as general ability. Rather, student ability refers to the Rasch value that locates a person along an achievement dimension, and is represented by a student's raw score on a test. Second, one must be careful about interpreting as "complete mastery" a situation in which student ability is greater than the difficulty of items testing a domain of knowledge.

Curriculum charts were constructed for grades 1 through 5. Curriculum charts are graphic representations of the structure of a set of curriculum objectives. A curriculum chart is constructed by averaging the difficulties of items assessing each curriculum objective and plotting these averages on a graph with difficulty along the ordinate and curriculum domains along the abscissa. Since item difficulty and student ability are on the same dimension, average student ability for each grade level can

be represented by a line crossing the ordinate at the appropriate point. For comprehension, the average student ability was greater than the difficulty of most objectives in this curriculum. This means that, on the average, students have learned most of the material specified in the curriculum. This result is expected since the items were pilot tested at the end of the school year. Several uses for curriculum charts were delineated in this section of the report.

Item difficulty, student ability, and item response patterns were used to analyze group performance on the curriculum objectives within each of the fourteen domains of the CCSD Language Arts Comprehension Curriculum. The domains were collapsed into five content areas that are closely aligned to the South Carolina Basic Skills Assessment Program. These content areas are Vocabulary Knowledge, Main Idea, Literal Comprehension, Inferential Comprehension, and Analysis of Literature. In addition to performance results, this section contains general recommendations for instruction in each of the five broad content areas. Highlights of this section are as follows:

Vocabulary knowledge. Analysis of performance on the vocabulary items indicated that in grades 3 through 5 children had the most difficulty with structural word meaning and contextual word meaning items. Multiple meaning items were difficult when the word was used in an unusual way or when the context was not "rich." Student performance on the analogy items suggested that vocabulary development is very idiosyncratic. Recommendations for instruction focused on activities that underscore the development of both precision and flexibility in vocabulary knowledge.

Main idea. In grades 1 and 2 students had difficulty recognizing a main idea statement that was not a direct restatement of a main idea sentence from the reading selection. Recognizing a paraphrased main idea statement was as difficult as recognizing an inferred statement of a main idea, until grade 3, when recognizing restated and paraphrased main idea statements became of equal and less difficulty than recognizing an inferred main idea. Analysis of incorrect response patterns indicated that by grade 5 students were not responding randomly. Instead, they tended to choose statements too narrow or too broad to be the main idea. Instructional activities incorporating verbal modeling of processes, and graphic organizers were recommended.

Literal comprehension. Data from performance on literal comprehension items suggested degrees of instructional emphasis that could be placed on particular objectives at the various grade levels. The difficulty of detail items dropped off from grade 1 to grade 2. It was recommended that teachers spend less instructional time on details in grade 2, and place greater emphasis on other literal comprehension skills. The difficulty level of detail items increased again at grade 3, perhaps reflecting the expansion in the breadth of text children are beginning to encounter. It was suggested that the instructional emphasis on details should increase, with a focus on distinguishing between relevant and irrelevant details. By grades 4 and 5 the difficulty level of detail items once again dropped off: it was recommended that instructional emphasis reflect this drop with a shift to other, more difficult objectives in the curriculum.

Inferential comprehension. Difficulty of inferential comprehension items was related to the number of sentences from which the student had to draw information to make the inference, the amount and clarity of available cues for making the inference, and the extent to which the student had to draw upon his/her own fund of knowledge about the topic. Recommended instructional activities emphasized teacher modeling of problem solving strategies and group prereading activities designed to activate prior knowledge about a topic.

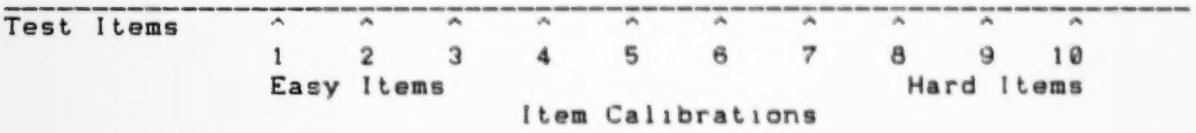
Analysis of literature. Analysis of literature items tested the students' abilities to critically examine written text. Specific skills in the areas of figurative language, fantasy/reality, fact/opinion, and structural elements were assessed. Among figurative language items those containing metaphors and personification were the most difficult. Students had more difficulty identifying fact statements than opinion statements. In grades 2 through 4 students seemed to be cued to incorrect answer responses that contained language used in the stimulus. Recommended instructional activities included the use of fables for teaching the difference between fantasy and reality; teaching the structure of fact and opinion statements; and the use of story maps as a device for helping students develop a schema for narrative text.

Data Analysis

This report examines student performance on a test composed of items developed to be aligned with the CCSD Language Arts Comprehension Curriculum. The test items were pilot tested in May of 1986 and analyzed using the Rasch measurement model.

In this report reference is frequently made to two test statistics. These statistics are item difficulty and student ability. Both statistics are on the same scale which is divided into units of measure called logits.

Rasch analysis results in the assignment of a value in logit units to each test item. This value represents the item's difficulty level relative to other items in the item bank. The process of assigning a value of difficulty to each test item is called item calibration. An item's difficulty increases in proportion to the number of incorrect responses made by students to the item. Calibrated items can be placed along a continuum from easy to hard.

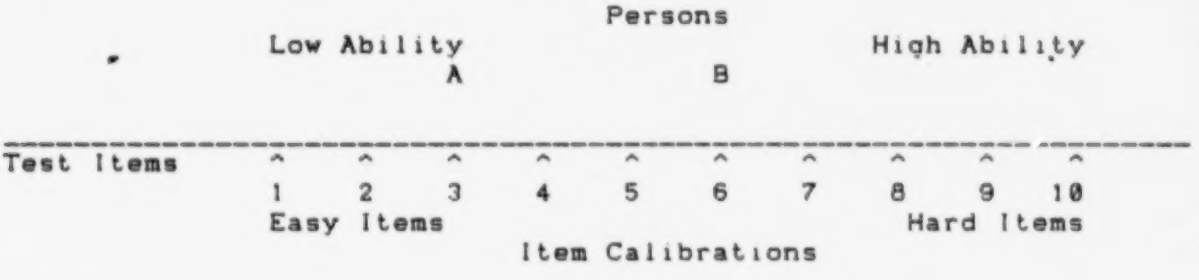


This approach was used to create language arts item banks for grades 1 through 8. In addition, the language arts items were vertically equated into one overall bank. Following within-grade calibration, the item difficulties were linked together on a common dimension of difficulty. Vertical equating allowed for

comparisons between the difficulty of objectives and the ability of students across grade levels.

The purpose of "testing" is to estimate a person's location along an achievement dimension implied by a test. The term <u>student ability</u> is used to represent the Rasch value that locates the person along this achievement dimension. A student's ability increases in proportion to the number of his/her correct responses on the test.

Since item difficulties and student abilities are measured with the same units (i.e., logits) they can each be plotted along the same continuum. Below is an example of the performance of two persons on a ten item test.



To understand the concept of student ability it is important that one not confuse it with notions such as general ability (i.e., "g"), or aptitude. Rather, one should think of student ability in terms of the probability of giving a correct response to a test item. When the ability level of a person is greater than the difficulty level of an item, then the probability of the person answering the item correctly is greater than one half. However, when the ability level of a person is less than the

difficulty level of an item, the probability of the person answering the question correctly is less than one half. Finally, when levels of ability and difficulty are the same, the probability of the person answering the question correctly is exactly one half. Refer to the figure above. The probability of person B answering item 1 correctly is greater than one half, while the probability of person B answering item 10 correctly is less than one half. Thus, it is likely that person B can answer item 1 correctly but unlikely that s/he will be able to answer item 10 correctly. The probability of person B answering test item 6 correctly is one half; that is, person B has a 50-50 chance of answering item 6 correctly.

When comparing item difficulty and student ability, another caveat must be stressed. If a student's ability were higher than the difficulty level of all of a set of items testing a domain of knowledge, one might be tempted to interpret this as "complete mastery" of the domain, particularly if the student were to obtain a perfect test score. But unless the set of items actually contained the most difficult item that could ever be written for that domain there would always be the possibility of other items which were even more difficult. On the hardest possible test even a "perfectly scoring student" might answer items incorrectly, revealing that mastery was not complete at all. In the case of language comprehension, a more accurate view of the comparison between student ability and item difficulty is that it illustrates progress through a curriculum.

Curriculum Charts

A curriculum chart is a graphic representation of the structure of a set of curriculum objectives. A curriculum chart is constructed by averaging the difficulties of items assessing each curriculum objective and plotting these values on a graph with difficulty level along the ordinate and the curriculum domains along the abscissa. Since item difficulty and student ability are on the same dimension, the average student ability for each grade level can be represented by a line crossing the ordinate at the appropriate point. In this way average student ability can be used as an estimate of the typical student's standing relative to the curriculum objectives.

Curriculum charts of the Language Arts Comprehension Curriculum have been developed for grades 1 through 5. (Refer to Figures 1 through 5 following this section.) The ability lines show that, on the average, student ability is greater than item difficulty, indicating that the average student has learned most of the material specified in the curriculum. These high levels of achievement are to be expected since the items were pilot tested at the end of the school year. They do not mean the pilot test was too easy for the students.

Curriculum charts have several uses. They illustrate the relative difficulty of the objectives in a curriculum. Teachers can use this information to plan instructional time, or to sequence objectives. That is, teachers can allocate more instructional time to the more difficult objectives: and/or teachers can teach the easier objectives earlier in the year.

Raw scores can be converted into an ability measure for each student. These student abilities can be plotted on the curriculum chart. Teachers can see where an entire class or one individual falls along the curriculum continuum. This information could be used to form instructional groups, or combined with right-response data to plan remedial instruction for one individual.

Curriculum charts can be used as growth charts. An individual's ability measure can be plotted on the chart at designated times during the school year or over grade levels to illustrate progress through the curriculum. Such a report might be informative to parents.

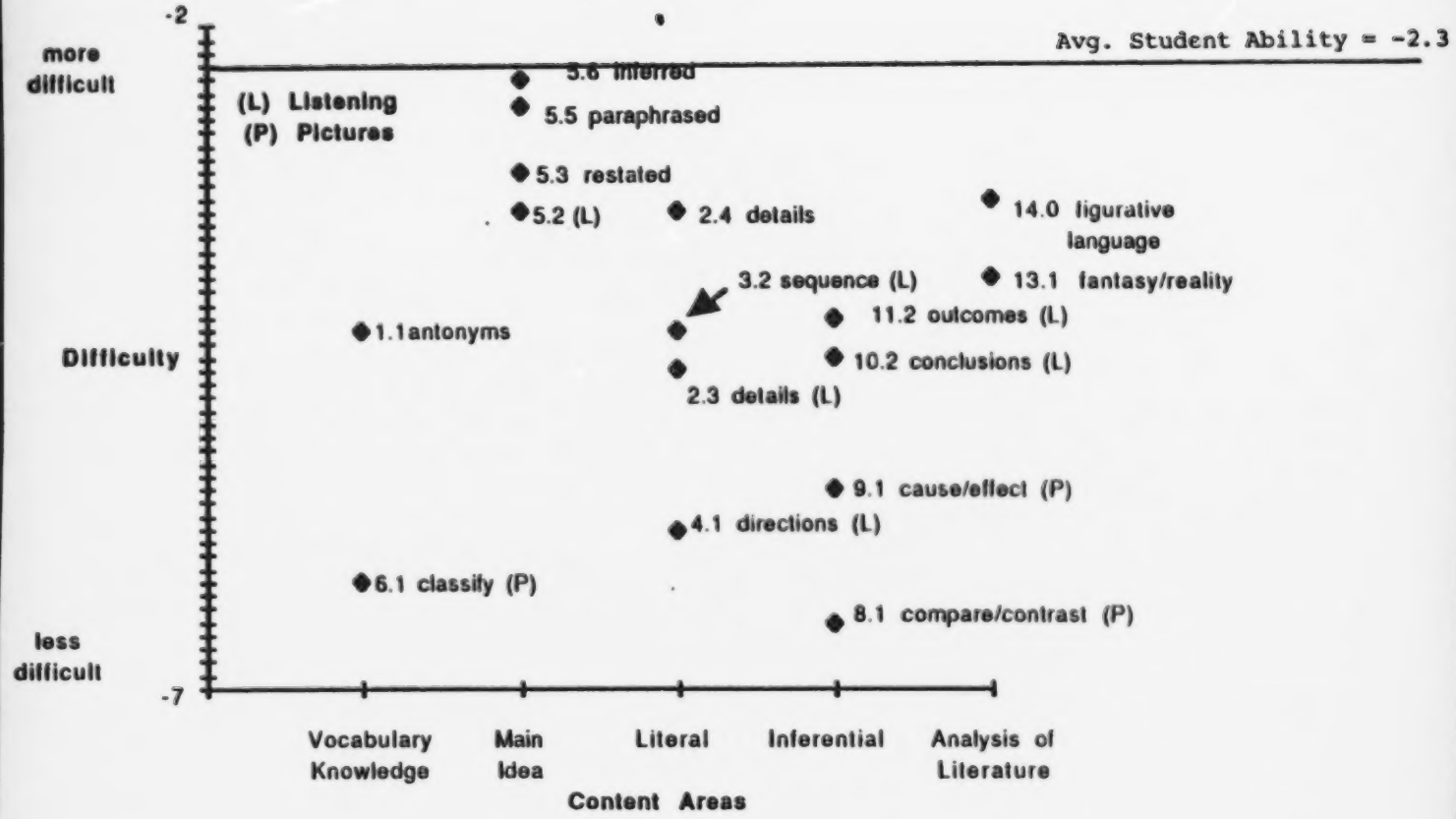


Figure 1. Curriculum chart for grade 1.

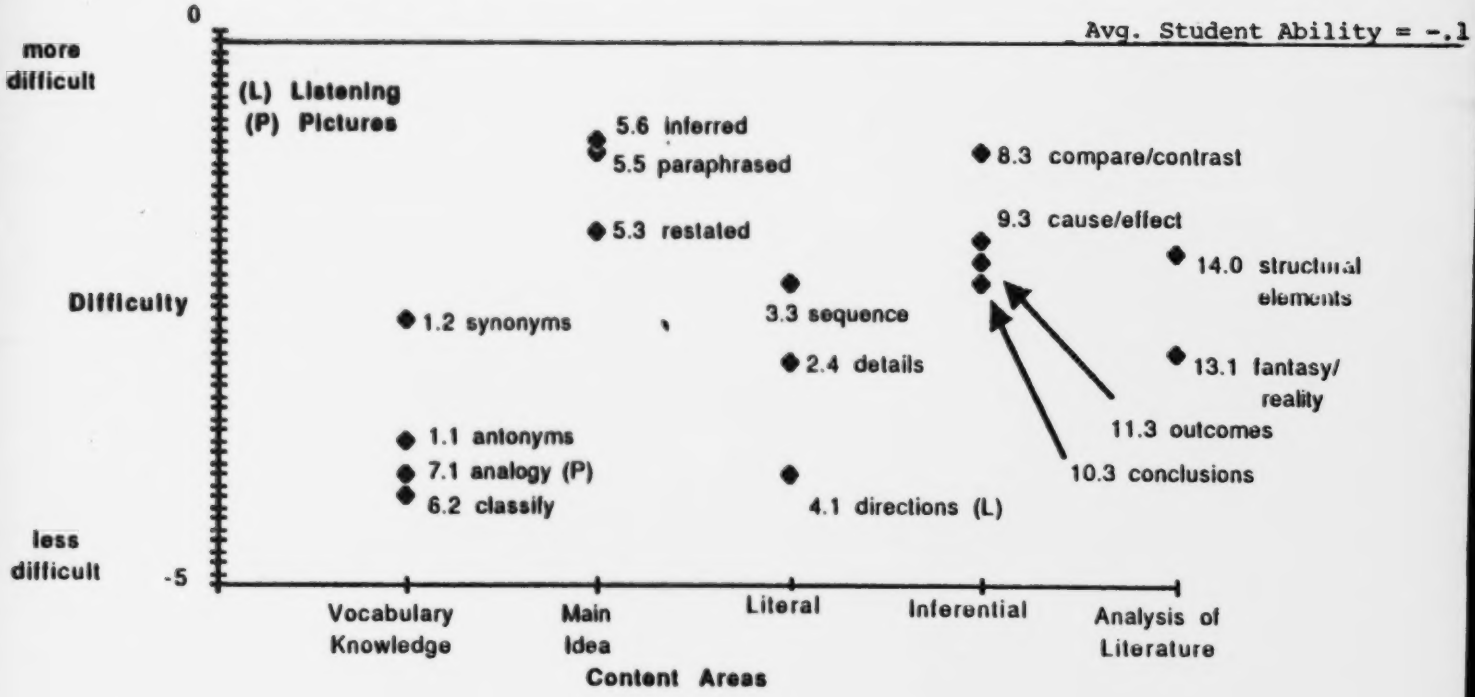


Figure 2. Curriculum chart for grade 2.

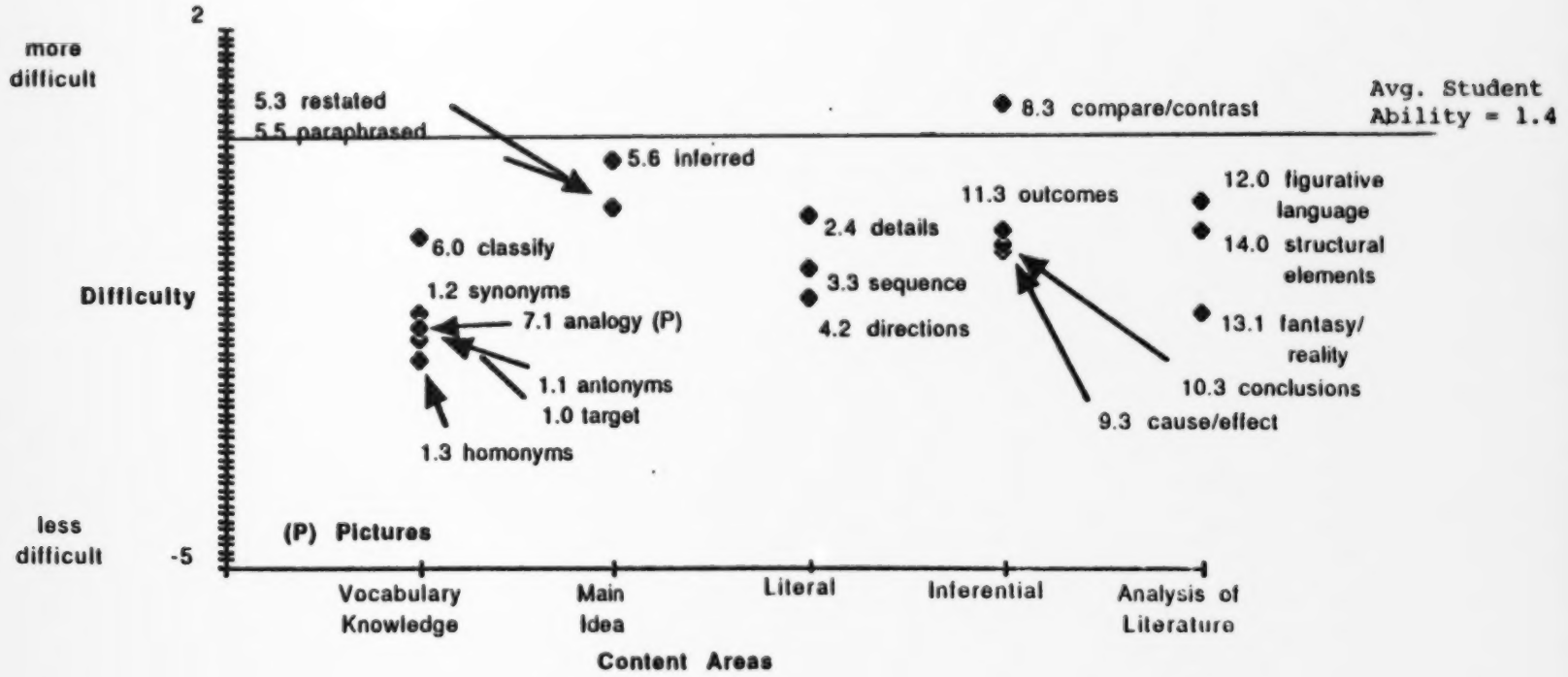


Figure 3. Curriculum chart for grade 3.

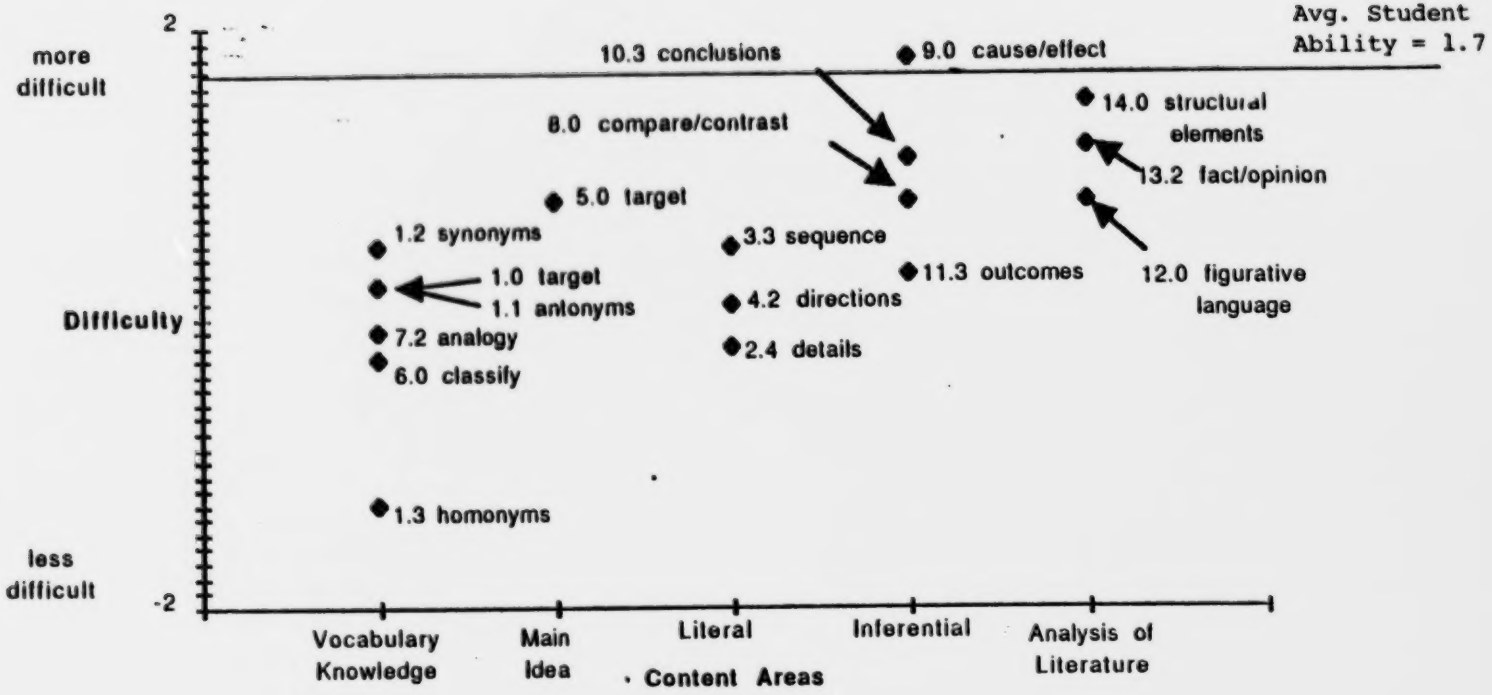


Figure 4. Curriculum chart for grade 4.

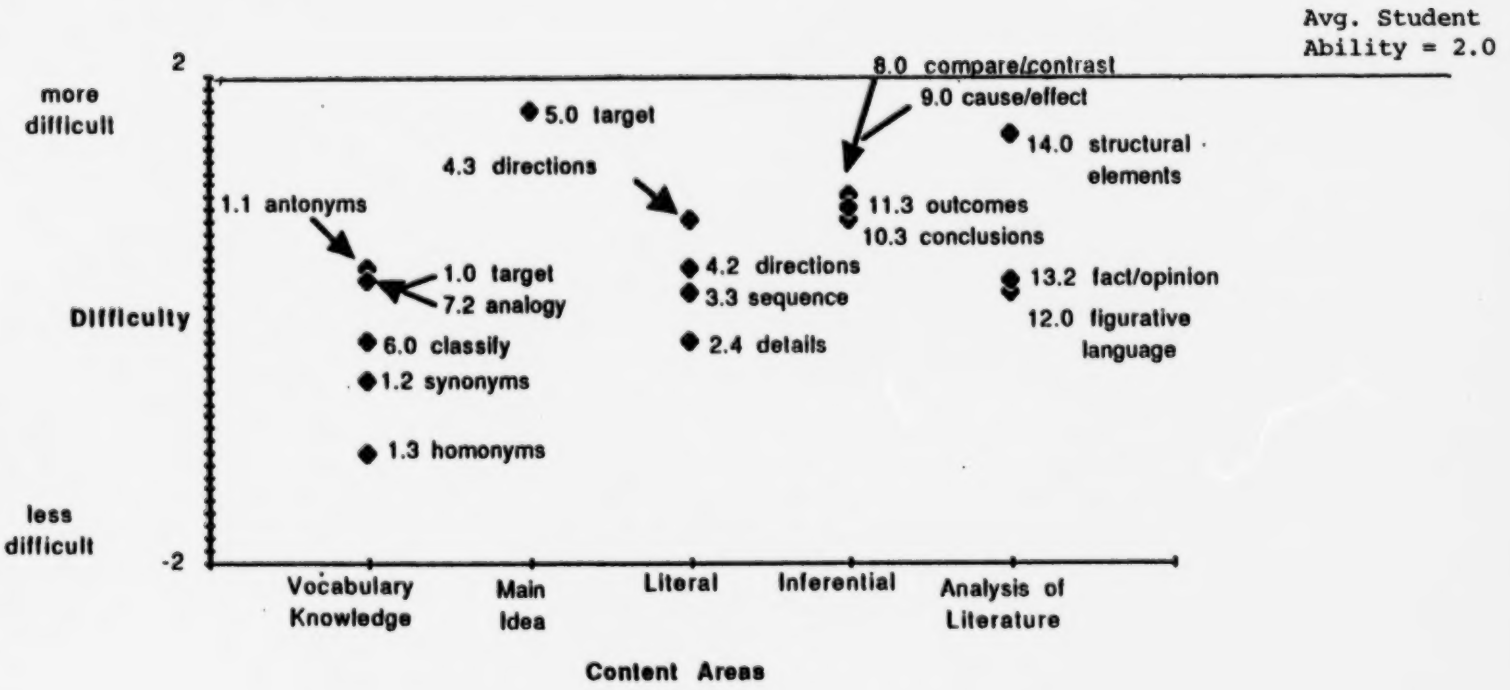


Figure 5. Curriculum chart for grade 5.

Analysis by Objectives

Item difficulty, student ability, and item response patterns were used to analyze group performance on objectives of the Language Arts Comprehension Curriculum. At the time the items testing these objectives were piloted Charleston County's Language Arts Comprehension Curriculum consisted of fourteen domains representing literal, inferential, and evaluative skills. Within each domain were a set of hierarchically arranged objectives, culminating with a "target" objective. The hierarchical arrangement was designed to define an instructional program for each domain.

The curriculum has since been restructured, however, the revisions were not available at the time this report was being prepared. For this report the fourteen domains were collapsed into five content areas that are closely aligned to the South Carolina Basic Skills Assessment Program. These content areas are Vocabulary Knowledge, Main Idea, Literal Comprehension, Inferential Comprehension, and Analysis of Literature.

Interpretations of objective or domain difficulty were made relative to student ability. As the difference between average student ability and average item difficulty increased the difficulty level of the objective or domain was said to decrease. Similarly, as the difference between the two decreased, the difficulty level of an objective or domain was said to increase. This interpretation is in accordance with the concept of the probability of giving a correct response to a test item (cf the Data Analysis section of this report).

Vocabulary Knowledge

Three domains (Word Meaning, Classification, and Analogies) have been grouped together under one content area, Vocabulary Knowledge. Ability to answer these test items appeared to be more dependent upon understanding the meanings of individual words than upon understanding the meaning of connected text. Figure 6 shows the relative difficulty among vocabulary knowledge objectives in grades 1 through 5.

Domain 1: Word Meaning

Obj. 1.0: The learner can determine the meaning of words.

Obj. 1.1: Given paired sentences, one with a missing antonym, the learner can identify the missing antonym.

Obj. 1.2: Given paired sentences, one with a missing synonym, the learner can identify the missing synonym.

Obj. 1.3: The learner can identify the missing homonym in an incomplete sentence.

In grade 1, only antonyms (1.1) were tested. Of the first grade objectives tested, it was the easiest among those requiring interaction with print. Synonyms (1.2) were tested in grade 2. In grade 2 antonym items were on average easier than synonym items. At this level students may have been answering items by using memorized associations rather than by using critical elements of the word's meaning to reason an answer.

In grades 3 through 5 two additional word meaning objectives were tested. These were homonyms (1.3) and the target objective (1.0). The target objective was tested with contextual word

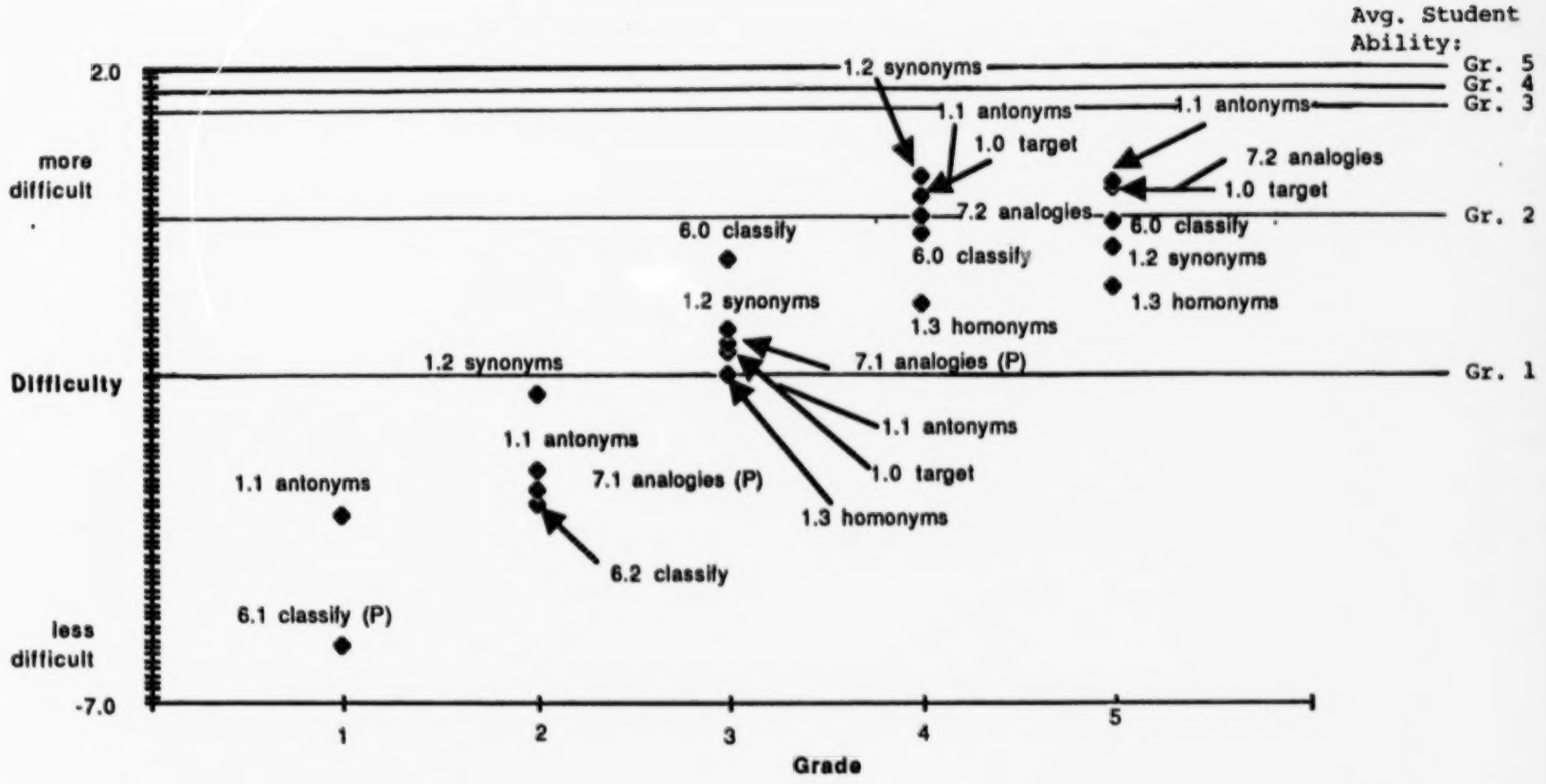


Figure 6. Relative difficulty among vocabulary knowledge objectives.

meaning, structural word meaning, sight recognition, and multiple meaning items. The homonym objective may have been tested incorrectly. Theoretically there is a difference between homonyms, homophones, and homographs. (Homonyms are words with the same pronunciation and spelling but with different meanings [i.e., multiple meanings]. Homophones are words with the same pronunciation but with different spellings and meanings [e.g., there, their]. Homographs are words with the same spelling but with different pronunciations and meanings [e.g., The wind blew. Wind the watch.].) All three word categories are sometimes grouped together, albeit incorrectly, as homonyms. At any rate homonyms were tested under the target objective as multiple meaning words and homophones were tested under the homonym objective.

The homonym objective was the easiest of the word meaning objectives at grades 3, 4, and 5. Among the homonym items, difficulty correlated -.49 ($p < .01$) with the frequency of occurrence in print of the correct response. This means that as the frequency of the occurrence in print of the correct responses decreased the items increased in difficulty. ("Frequency of occurrence in print" refers to the number of times a word appears in generally read materials such as newspapers, magazines, and books. For example, "the" has a high frequency of occurrence in print. Frequency measures were taken from Kucera and Francis, Computational Analysis of Present-Day American English.)

In grades 3 through 5 children appeared to have the most difficulty with the structural word meaning and contextual word meaning items used to test the target objective. Multiple meaning items were difficult when the word was used in an unusual way

or when the context was not "rich." Generally sight recognition items were the easiest. These most likely represented a decoding task. That is, once lexical access was achieved through phonological recoding the meaning was readily available.

Domain 6: Relationships (Class)

Obj. 6.0: The learner can group words according to relationships.

Obj. 6.1: The learner can group pictures into categories.

Obj. 6.0: The learner can arrange words into given categories.

Objective 6.1 was tested in grade 1 by having the students choose, from a group of four pictures, the one that did not belong. Items testing this objective were very easy relative to other items measuring vocabulary knowledge. There are at least two reasons why this could be the case. First, pictures made the task very concrete. Second, the use of pictures eliminated the necessity to decode any words. The most difficult items in this group were those in which the odd picture was frequently associated with one member of the related trio. For example, baseball and bat are frequently associated together, however the common, critical element that linked baseball to the other pictures was not the element of meaning that linked baseball to bat.

Objective 6.2 was tested in second grade. Presented with a set of four related words and the question "What else belongs?" students chose, from the three answer choices, another word that would fit in the category. These items were generally easy. Variation in difficulty seemed to be related to specificity of

categories: items representing more general categories, (e.g., animal) usually were easier.

Objective 6.0 was tested in grades 3, 4, and 5 in a manner similar to the way objective 6.1 was tested. For this objective students had to choose the word that did not belong. In grade 3 difficulty again seemed to be related to specificity of categories. For example, deciding "beaver" did not belong with names of birds was harder than deciding ruler did not belong among names for money. In grades 4 and 5 items were difficult when the relationship was synonyms for the same concept.

Domain 7: Relationships (Analogies)

Obj. 7.1 The learner can determine analogous relationships using related pictures.

Obj. 7.2 The learner can determine analogous relationships using related sentences.

Objective 7.1 was tested in grades 2 and 3 and objective 7.2 in grades 4 and 5. The testing formats were parallel; 7.1 used pictures to express the analogy, 7.2 used words. The student had to draw an analogy when given one pair and one member of the analogous pair. Students had difficulty with 7.1 analogies when incorrect answer choices were related to the given member of the second pair, but not in a way that would complete the analogy. This suggests that children were having difficulty determining the critical element of meaning which formed the relationship between the two pairs of words. That is, their vocabulary knowledge may not have been flexible and/or precise enough for them to sort out the most important elements of meaning.

No clear patterns of difficulty emerged among the items

testing objective 7.2. The grade 4 data suggested that "worker/article created" and "user/tool" relationships were difficult, however the connection was not uniformly robust. One might expect item difficulty to be related to the grade level (as determined by the SC Word List) of the words used in the analogy items. However, no correlations between difficulty and grade level were significant ($p > .05$). Thus, knowledge of word meanings appears to be idiosyncratic, perhaps developed through each individual's unique experiences with language. Furthermore, words at higher grade levels (as determined by the SC Word List) may not be inherently more difficult to learn. The data for objective 7.2 do support the growing body of research showing that vocabulary knowledge is mostly developed through reading, given the assumption that the greater part of an individual's reading experiences are unique.

Recommendations: Vocabulary Knowledge is perhaps one of the most important content areas in a reading curriculum. There are now a growing amount of data from recent reading research to support a causal connection between knowledge of word meanings and variations in reading comprehension ability. The notion of a limited capacity processor further underscores how crucial is this domain. (Limited capacity processor implies that when certain components of the reading task, i.e., decoding, access to word meaning, become automatic the reader can devote conscious attention to the meaning of the connected text.) Ironically Word Meaning is probably one of the most difficult domains in which to

instruct. The evidence to support the notion that the bulk of vocabulary growth occurs inductively through the learning of meanings as words are encountered during reading is strong. There is an excellent article in Reading Research Quarterly. Vol. XXI. No. 4 (Keith E. Stanovich, Matthew effects in reading: Some consequences of individual differences in the acquisition of literacy.) that discusses the relationship of vocabulary knowledge and its development to overall reading achievement. If this article, or the information contained therein, were generally available to teachers, it could help them form a theoretical foundation upon which to base their reading instruction.

The difficulty of the structural and contextual analysis, and multiple meaning items suggests that both precision and flexibility play a role in acquiring knowledge of word meanings. Being able to focus on critical elements of meaning requires precise knowledge about a word's meaning. Working with multiple meanings and the connotations of words requires flexibility. Instruction which focuses on activities emphasizing the critical elements of a word's meaning should help accomplish these ends. Activities such as semantic feature analysis and semantic networking underscore critical elements. Semantic networking activities may be especially beneficial because the scheme of a semantic network illustrates relationships words can share (e.g., class, property, example). In addition, students should be encouraged to verbalize their understandings of a word's meaning, perhaps in situations where they tell why a particular word is a synonym or antonym of another word. At this level teachers may need to develop the concept of multiple meanings, as well as the

multiple meanings of specific words.

The easiness of the homophone items relative to the other word meaning items suggests that their real difficulty may be with written production rather than with recognition and lexical access during reading. The corrected test method of spelling practice may be very useful for helping students acquire word-specific information necessary to spell various homophones. The relationship to frequency suggests that children will learn to read most high frequency homophones indirectly as a by-product of reading/writing activities.

Finally, given recent evidence of how vocabulary growth occurs, teachers should be encouraged to provide time each day for students to read independently in materials of their own choosing. In addition, teachers should be encouraged to read daily to students from a variety of genre. If each of these activities were at some point explicitly stated in the curriculum guides, teachers would be less hesitant to use instructional time in their pursuit.

Research Within Reach Secondary School Reading (IRA, 1987) contains additional instructional strategies useful for vocabulary development in grades 4 and 5.

Domain 5: Main Idea

Obj. 5.0: The learner can identify the main idea of a reading selection.

Obj. 5.2: The learner can identify the main idea of a story presented orally.

Obj. 5.3: The learner can identify the restated main idea of a reading selection.

Obj. 5.5: The learner can identify the paraphrased statement of the main idea in a reading selection.

Obj. 5.6: The learner can identify the inferred main idea of a reading selection.

Objective 5.2 was tested in grade 1. Objectives 5.3, 5.5, and 5.6 were tested in grades 1 through 3. Objective 5.0 was tested in grades 4 and 5. Figure 7 shows the relative difficulty among the main idea objectives in grades 1 through 5.

Objective 5.2 was tested by having students listen as a passage containing either a directly stated or implied main idea was read, and then choose the best statement of the main idea. The main idea statement was either restated, paraphrased or an inference of an implied main idea. Objectives 5.3, 5.5, 5.6, and 5.0 were tested by having the student read a selection and choose the best statement of the main idea. The reading selections differed in whether they contained an explicit statement of the main idea or whether the main idea had to be inferred. The correct answer choices differed in whether the main idea statement was restated directly from the passage (5.3), a paraphrase of an explicitly stated main idea (5.5 and 5.0) or an inference of an implied main idea (5.6 and 5.0).

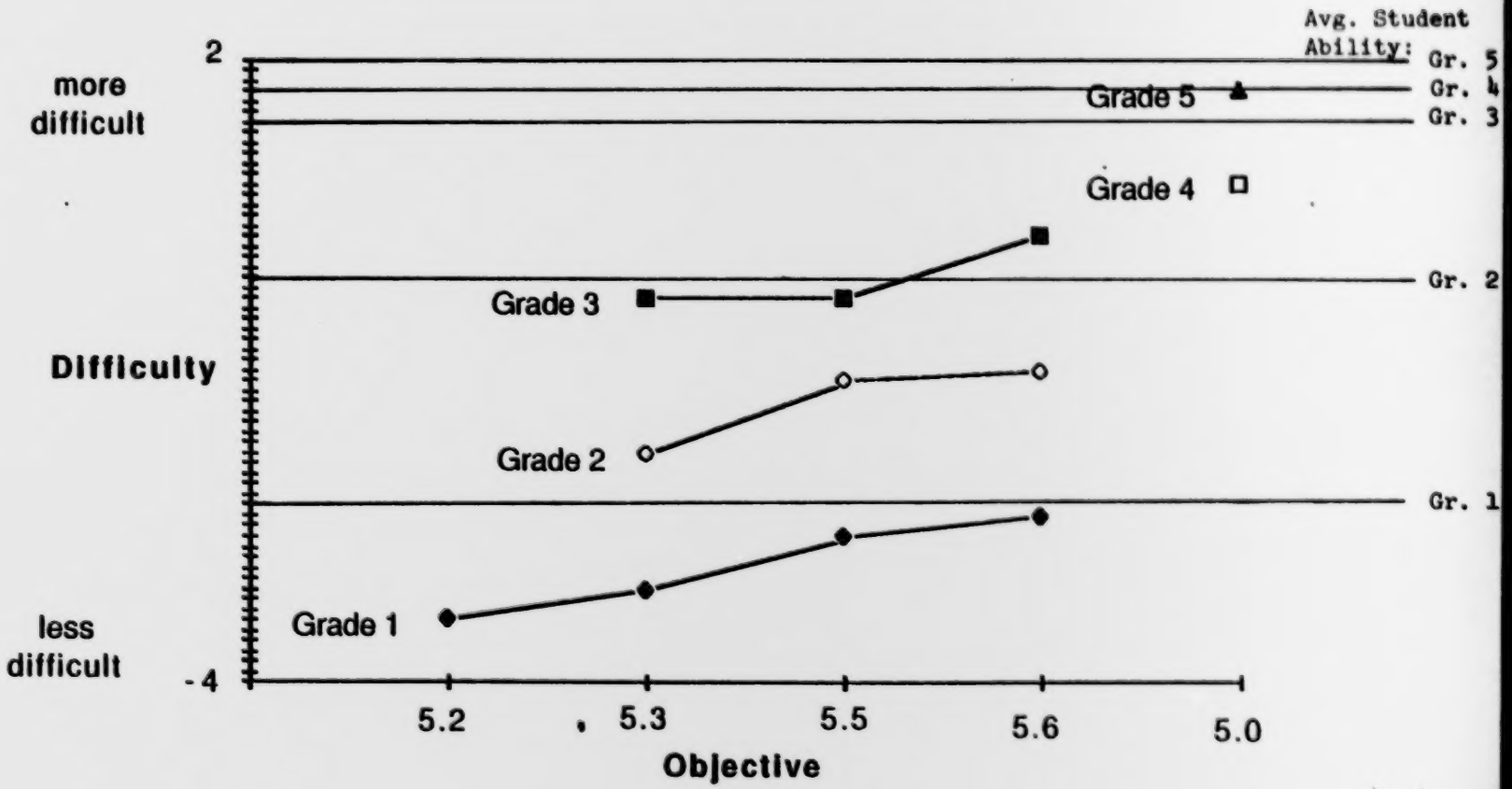


Figure 7. Relative difficulty among main idea objectives.

In grade 1 low ability students scored at chance on items testing objectives 5.5 and 5.6. Also in grades 1 and 2 students had difficulty recognizing a main idea statement that was not a direct restatement of the main idea sentence from the reading selection. In grades 1 and 2, recognizing a paraphrased main idea statement appeared to be as difficult as recognizing an inferred statement of a main idea. By grade 3 recognizing restated and paraphrased main idea statements were of equal and less difficulty than recognizing an inferred main idea.

Recommendations: In grades 1 and 2 instruction might be sequenced from restated main idea to parapharased main idea to inferred main idea. A differentiation between restated and paraphrased main ideas may not be as important in grade 3. The differences between restated, paraphrased, and inferred main idea statements need to be clearly demonstrated to students. In addition to locating main idea statements in reading material, activities could focus on having students compose main idea statements. Other recommendations are to vary text organization so that the main idea statement appears at different places (e.g., beginning, middle, end) in the reading selection, and to use graphic organizers to show the relationship between a main idea and the details that support it.

Analysis of incorrect response patterns indicated that by grade 5 students were not responding randomly. Instead, they tended to choose statements too narrow or too broad to be the main idea. When using multiple choice main idea practice activities, teachers could examine and discuss answer choices with students.

especially emphasizing why an answer choice is incorrect (e.g., too general, too specific, contradicted by other information in the text).

Finally, verbal modeling of the mental process used to determine a main idea should be used by teachers to instruct students.

Literal Comprehension

This content area contains the CCSD Language Arts Comprehension domains that focus primarily on the comprehension of material explicitly stated in a reading selection. These domains are Details, Sequence, and Following Directions. Figure 8 shows the relative difficulty among the objectives testing literal comprehension in grades 1 through 5.

Domain 2: Details

Obj. 2.3: The learner can identify details in a story presented orally.

Obj. 2.4: The learner can identify details in a selection.

Objective 2.3 was tested in grade 1. Students listened to an oral selection and answered a question about a detail explicitly stated in the text. Objective 2.4 was tested in grades 1 through 5. Students read a selection and answered a question about a detail explicitly stated in the text.

There was very little variation in difficulty among the items testing these objectives. The data suggest that students have difficulty with items (obj. 2.4) requiring memory of several similar details (e.g., three flowers, two trees, five leaves: How many trees?)

Domain 3: Sequence

Obj. 3.2: The learner can arrange in sequential order illustrations of a story presented orally.

Obj. 3.3: The learner can identify the sequence of main events in a reading selection.

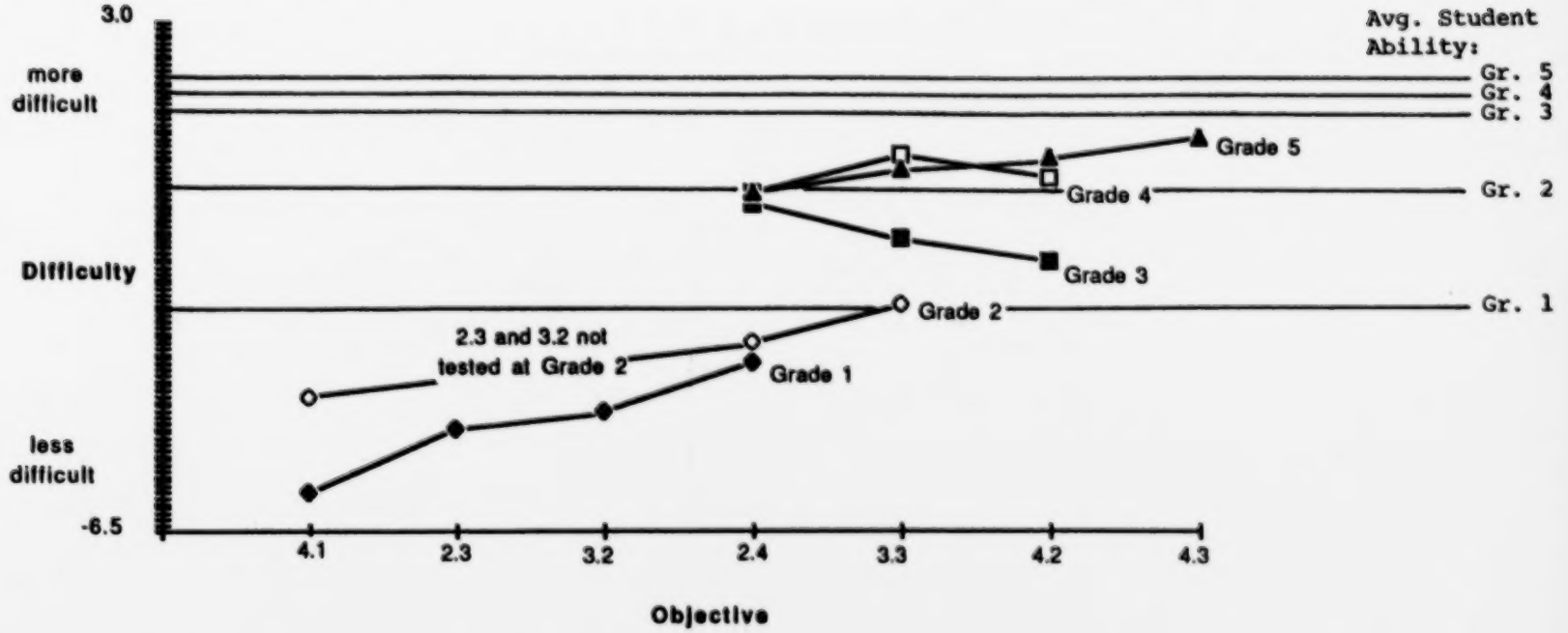


Figure 8. Relative difficulty among literal comprehension objectives.

Objective 3.2 was tested in first grade. Students listened to a story and then selected a picture that showed what came first or last. Objective 3.3 was tested in grades 2 through 5. Students read a selection and then selected a statement that told what happened first or last. (In grades 3 and 4, questions also asked what happened just before or just after an event.) No clear pattern related to item difficulty emerged.

Domain 4: Following Directions

Obj. 4.1: The learner can complete a task after hearing a set of directions.

Obj. 4.2: The learner can complete a task after reading a set of directions.

Obj. 4.3: The learner can identify steps to complete a given task.

Objective 4.1 was tested in grades 1 and 2. Students listened as directions were read and then chose a picture that showed the directions were followed correctly. Directions in grade 1 had one step. Grade 2 directions had two to three steps. Objective 4.2 was tested in grades 3 through 5. Students read a selection and then chose a picture that showed the directions were followed correctly. The number of steps in the directions continued to increase from grades 3 to 5. Objective 4.3 was tested in grade 5. Students read a passage and chose a statement which was correct based upon the directions in the passage.

Item difficulty in this domain was strongly related to the complexity of the directions in the passage. The correlation between item difficulty and the number of steps in the directions was .77 ($p = .0001$).

Recommendations: Figure 8 shows the relative difficulty among the objectives testing literal comprehension in grades 1 through 5. The data suggest degrees of instructional emphasis that should be placed on particular objectives at the various grade levels. In grade 1 details (2.4) is one of the hardest objectives in this content area, but that difficulty drops off at grade 2. Teachers could consider spending less instructional time on details (2.4) in grade 2, and placing greater instructional emphasis on other literal comprehension skills. At grade 3 the difficulty of the details skill (2.4) again increases, perhaps reflecting the expansion in the breadth of the text children are beginning to encounter. The instructional emphasis on this objective should again increase, with a focus on distinguishing between relevant and irrelevant details. By grades 4 and 5 the difficulty of details (2.4) again drops off. Instructional emphasis should reflect this drop and shift in grades 4 and 5 from the Details domain to Sequence and Following Directions.

The difference in difficulty level between following oral directions (4.2) in grades 1 and 2 and other objectives is also striking. Consideration should be given to incorporating this objective into the kindergarten curriculum.

Teachers may want to have children practice imaging a process to help them deal with complicated directions in written text.

Inferential Comprehension

This content area contains the CCSD Language Arts Comprehension domains that focus on the comprehension of information inferred by a reading selection. These domains are Compare/Contrast, Cause/Effect, Drawing Conclusions, and Predicting Outcomes. Figure 9 shows the relative difficulty among the objectives testing inferential comprehension in grades 1 through 5.

Domain 8: Compare/Contrast

Obj. 8.0: The learner can compare and contrast elements in a reading selection.

Obj. 8.1: The learner can compare and contrast details of pictures.

Obj. 8.3: The learner can identify characteristics that compare and contrast objectives, characters, time and places in a reading selection.

Objective 8.1 was tested in first grade. Students answered a question about a set of three pictures (e.g., Which frog is <superlative form of adjective>?). Objective 8.3 was tested in grades 2 and 3. Objective 8.0 was tested in grades 4 and 5. For objective 8.3 students responded to a question by choosing a fact to support a conclusion. Questions for objective 8.0 required the students to draw a conclusion. The former was a recognition task, while the latter required recall of information to make a decision. Quantitative variations in the item stems did not appear to account for the range of difficulty among the items. Variations in the content of the items suggest that difficulty may be related to student familiarity with the topic, although

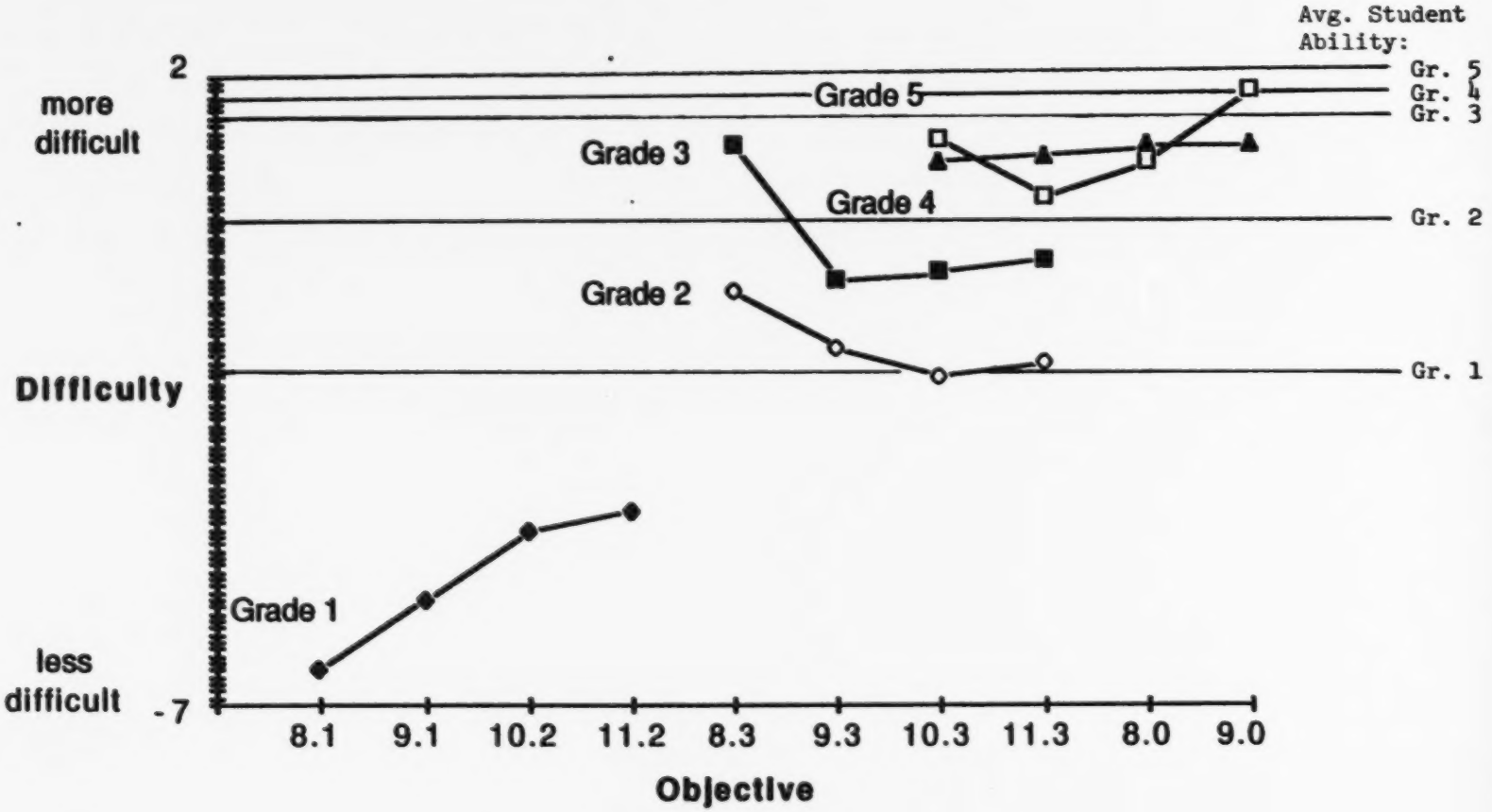


Figure 9. Relative difficulty among inferential comprehension objectives.

this cannot be empirically supported since no measure of topic familiarity is available.

In grade 2, items in which the correct answer choice was a restatement of a detail tended to be easier than items in which the correct answer choice was a paraphrase of a detail. This distinction did not appear as striking in the grade 3 data. These results are consistent with the shift in relative difficulty level from grade 2 to grade 3 of the restated and paraphrased main idea items.

Domain 9: Cause/Effect

Obj. 9.1: The learner can identify cause and effect relationships by matching pictures.

Obj. 9.3: The learner can identify statements that imply cause and effect relationships in a paragraph.

Obj. 9.0: The learner can identify implied causal relationships in a reading selection.

Objective 9.0 was tested in grade 1. Students responded to a set of pictures by answering a question about why something happened. Objective 9.3 was tested in grades 2 and 3. Objective 9.0 was tested in grades 4 and 5. For 9.3 and 9.0 students responded to a reading selection by identifying the cause for an effect stated in a question. There was some indication that the difficulty level of the reading items was related to the amount of text between the sentence inferring the cause and the sentence telling the effect, as well as to the breadth of contextual constraint (i.e., the number of sentences from which the student had to draw information to make the inference). The degree to which prior knowledge had to be called upon to make the inference

also seemed to affect the difficulty level of the questions.

Domain: Drawing Conclusions

Obj. 10.2: The learner can identify logical conclusions about characters or events described in a story presented orally.

Obj. 10.3: The learner can identify logical conclusions for a reading selection.

Objective 10.2 was tested in grade 1. Students answered a question about a story presented orally. The difficulty of items testing objective 10.2 was associated with the number of salient cues in the text. Objective 10.3 was tested in grades 2 through 5. Students answered a question about a reading selection. In grade 2 the difficulty appeared to be related to how clearly (rather than how many) the salient cues distinguished the objective or event being described. In grade 3 difficulty was related to the degree to which the conclusion could be textually derived. Those items requiring inferences from text to the reader's fund of knowledge about the topic (i.e., scriptually implicit) were more difficult than those requiring only a logical inference from information provided in the text (i.e., textually implicit). Thus when both question and response were derived from the text, the items were easier than when only the question was derived from the text. In grade 4 most of the questions were scriptually implicit. Figure 9 shows that from grade 2 to grade 5 items became more difficult relative to student ability. In grade 2 the student ability was two logits above the average difficulty of the items. In grades 4 and 5 student ability was only one logit above the average item difficulty. This trend continued into the

middle grades.

Domain: Predicting Outcomes

Obj. 11.2: The learner can predict a logical outcome of a story presented orally.

Obj. 11.3: The learner can predict a logical outcome of a reading selection.

Objective 11.2 was tested in grade 1. Students answered a question about a story presented orally. Objective 11.3 was tested in grades 2 through 5. Students answered a question about a reading selection. Patterns to explain ranges of difficulty among items did not emerge. The range of difficulty for 11.2 items was 1.5 logits. With the exception of one or two outliers at each grade, the items testing objective 11.3 tended to cluster very close together (range .5 logits) in difficulty.

Recommendations: The ability to answer inferential comprehension questions is related to general problem solving ability. Readers must elaborate by drawing upon past experiences to supply missing information. Teachers may want to model problem solving strategies that can be used to make inferences when reading. The Reading Teacher (Nov., 1983, p. 144) describes a strategy for improving ability to answer inferential questions.

Certain words cue compare/contrast and cause/effect situations. Students should be taught to recognize the verbal signals of these particular test structures. (See Research Within Reach Secondary School Reading, IRA, 1987 for specific instructional strategies.) Activities in which the teacher supplies the propositions and has the student supply the appropriate

cue word might be employed.

Discussions in which students are asked to explain how they reached decisions, citing examples from text to support their logic, could help students develop strategies for drawing conclusions. Teachers might also adopt a questioning format in some instructional situations to probe why a particular conclusion could or could not be drawn given the information in the text.

Finally students need to understand that in answering questions requiring an inference they should draw upon their own experiences and prior knowledge about the topic. Group prereading activities designed to activate prior knowledge about a topic may help students gain this insight. Swaby. Teaching and Learning Reading contains examples of prereading strategies.

Analysis of Literature

This content area contains the following domains: Figurative Language, Making Judgments, and Structural Elements. Figure 10 shows the relative difficulty among objectives in this content area.

Domain 12: Figurative Language

Objective 12.0: The learner can describe and analyze the use of figurative language in a reading selection.

Objective 12.0 was tested in grades 3 through 5. The simile, metaphor, personification and idiom were tested. Students chose the best meaning for a short reading passage. In grade 3 simile items appeared to be the easiest. Metaphors and personification items were the most difficult. In grades 4 and 5 personification items continued to be among the more difficult. Idioms were difficult when there was limited context to cue their meaning.

Domain 13: Making Judgments

Objective 13.1: The learner can identify sentences of fantasy or reality.

Objective 13.2: The learner can identify statements of fact or opinion in a reading selection.

Objective 13.1 was tested in grades 1 through 3. Students read three sentences and selected the one that was make-believe. Objective 13.2 was tested in grades 4 and 5. Students selected the fact from a set of three opinions and one fact, or the opinion from a set of three facts and one opinion.

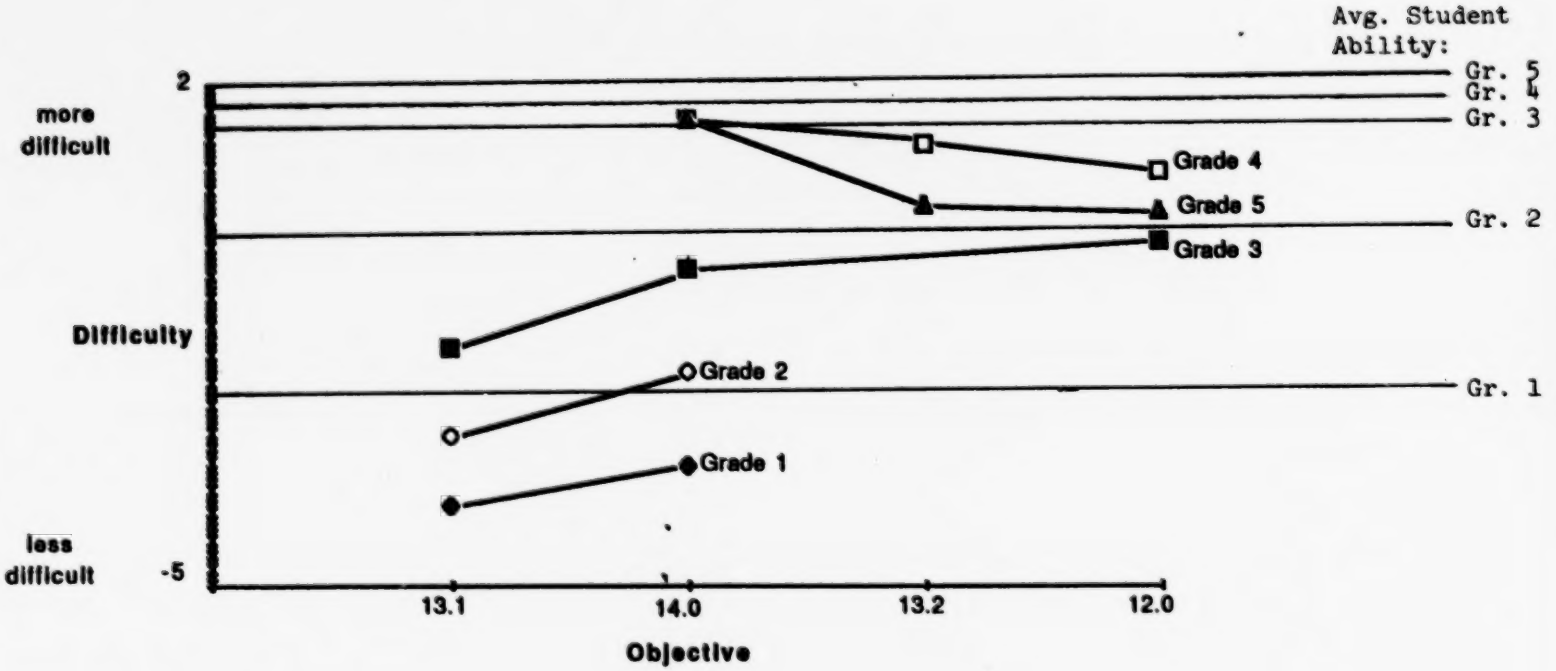


Figure 10. Relative difficulty among analysis of literature objectives.

Relative to student ability, objective 13.1 was the most difficult for grade 1 students. However, relative to the grade 1 curriculum, objective 13.1 was among the easiest requiring interaction with print. Easy 13.1 items appeared to be those with talking animals, when what the animal said was set off by quotation marks. Items in which the make-believe element involved an inanimate object were also easy.

Objective 13.2 was harder for grade 4 than grade 5 students. In both grades it was easier for students to identify opinions.

Domain 14: Structural Elements

Objective 14.0: The learner can identify structural elements in a reading selection.

Objective 14.0 was tested in grades 1 through 5. Students answered three questions about one reading selection. The questions were about the plot, the setting, and a trait of one character.

In grade 1 plot questions were easy for students. Analysis of the response data showed that students were cued to an incorrect response if it contained language used in the stimulus. For example, the phrase, "moved as fast as he could," cued students to the incorrect answer "He does not move very fast." This behavior was especially apparent in grades 2 through 4.

Recommendations: Fables might be useful for teaching the difference between fantasy and reality, particularly if students discussed what were the real and what were the fanciful elements.

Teachers should teach the structure of an opinion statement

versus that of a fact statement, and direct attention to words that cue opinions (e.g., should, must, ought).

Use of story maps would help children develop concepts about the elements of a story. Children's Literature in the Reading Program (IRA, 1987) is a good resource for other activities to develop children's story schemata.

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